

**REMARKS**

Claims 37-59 are pending in this application. Claims 37, 40, 42-45, and 52-53 have been amended. Claims 55-59 have been added.

Independent claims 37 and 45 have been amended to address the 35 U.S.C. § 112 issue raised by the Examiner in the Official Action. In particular, the preamble of claim 37 has been amended to specify that a method of selecting an asphalt mixture is being claimed. Accordingly, it is submitted that this claim is complete, commensurate in scope with the preamble, and in full compliance with 35 U.S.C. § 112, second paragraph. Independent claim 45 also has been amended to specify that the selected asphalt mixture is applied as an interlayer. It is submitted that claim 45 as now amended also is free from objection under 35 U.S.C. § 112. Accordingly, claims 38-44 and 46-54, which depend from claims 37 and 45, respectively, also should be free from objection under 35 U.S.C. § 112.

New independent claim 55 has been presented which, like claims 45-54 already of record, also is directed to a method of making an interlayer for a roadway. This claim is directed to a further unique and patentable aspect of Applicant's invention and defines a combination of features not shown in the references of record. This new claim is fully supported by the claims presently on file. See, for example, claims 38 and 39.

New independent claim 57 also has been presented. This claim, which is like claims 37-44 already of record, is directed to a method of selecting an asphalt mixture for making an interlayer. This claim is directed to a further unique and patentable aspect of Applicant's invention, namely, selecting a binder for making an asphalt mixture. This claim also is patentable over the references of record.

**The Obviousness Rejection**

Claims 37-47 and 49-54 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of U.S. Patent No. 6,248,396 to Helf (Helf) in view of U.S. Patent No. 3,907,582 to Walter (Walter) and U.S. Patent No. 5,306,750 to Goodrich (Goodrich). Claim 48 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Helf in view of Walter and Goodrich and further in view of U.S. Patent No. 3,891,585 to McDonald (McDonald). The Examiner notes that the primary reference, Helf, fails to teach performing stability and fatigue tests. However, the Examiner contends that these aspects would have been obvious in view of the secondary references, Walter and Goodrich. Specifically, the Examiner notes that Walter teaches the use of a Hveem stability test to determine the stability of an asphalt mixture. From this, the Examiner concludes that it therefore would have been obvious to utilize a Hveem stability test. The Examiner further notes that Goodrich teaches that a Flexural Beam Fatigue test is used to determine the fatigue life of an asphalt mixture. From this, the Examiner concludes that it would have been obvious to utilize a Flexural Beam Fatigue test. For the reasons set forth more fully below, Applicant submits that this rejection is without any proper basis and should be withdrawn.

**No Prima Facie Case of Obviousness Has Been Established**

As the standard for assessing obviousness, MPEP 706.02(j) lists three requirements for establishing a *prima facie* case of obviousness under 35 U.S.C. § 103:

- (1) First, there must be some suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the references to arrive at the claimed invention.

- (2) Second, there must be a reasonable expectation of success.
- (3) Finally, the prior art references must teach or suggest all of the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on Applicant's disclosure.

It is respectfully submitted that these three requirements have not been met. Therefore, Applicant respectfully submits that a *prima facie* case of obviousness for rejecting the pending claims has not been established. Claims 37-59 are not anticipated or made obvious by Helf in view of Walter and Goodrich. Still further, even if these references are combined with McDonald, claims 37-59 are not anticipated or made obvious.

**The Cited References Do Not Teach or Suggest the Subject Matter Claimed**

As admitted in the Office Action, Helf does not disclose or suggest the performance of a stability test or a fatigue test. Walter is cited for teaching that stability tests have been performed. Goodrich is cited for teaching that fatigue tests have been performed. However, neither Walter nor Goodrich suggests the desirability of performing both stability and fatigue tests on a proposed asphalt mixture before selecting an asphalt mixture for paving, as claimed in independent claims 37, 45, and 57. Out of the numerous performance tests that could be performed, there is no teaching or suggestion by the cited references of performing a stability **and** a fatigue test. There is no suggestion that an asphalt mixture should be selected after performing stability and fatigue tests, and there is no suggestion that the selection process should be based on the stability and fatigue performance of a proposed asphalt mixture, as claimed in independent claims 37, 45, and 57. Goodrich merely performs a fatigue test to verify the

properties of his new thermoplastic polymer-linked asphalt. Walter merely performs a Marshall stability test to determine a target asphalt content when adding treated incinerator residue but does not suggest stability testing should be integrated into the formulation process when practicing his invention. In fact, neither Walter nor Goodrich suggests performance testing as a design technique for formulating an asphalt mixture when one actually is practicing what is taught by these references.

In addition, neither Walter nor Goodrich suggests selecting an asphalt mixture for making an interlayer, as also claimed in independent claims 37, 45, and 57. In fact, neither Walter nor Goodrich even suggests making an interlayer for a roadway, as claimed by Applicant. Walter's teachings are directed to making a base course, and Goodrich's teachings are directed generally to paving and roofing applications. For the foregoing reasons, the cited references do not teach or suggest the subject matter claimed in independent claims 37, 45, and 57.

Claims 38-44 depend from claim 37 and are novel and non-obvious over the cited references for the same reasons that claim 37 is novel and non-obvious. In addition, Helf in combination with Walter and Goodrich does not disclose or suggest the particular minimum stability claimed by Applicant in claim 38, namely, a Hveem stability at 60°C and 50 gyrations of at least about 18. In fact, Walter, the reference cited for teaching a stability test, teaches that higher stability values are desirable but does not teach a minimum stability necessary for an interlayer, as claimed in claim 38.

Also, the combination of Helf in view of Walter and Goodrich does not disclose or suggest selecting an asphalt mixture for making an interlayer that has a Flexural Beam Fatigue of

at least about 100,000 cycles at 2000 microstrains, 10 Hz, about 2-4% air voids, and at a temperature of about 0 to 30°C, as claimed in claim 39. The only reference that is cited to suggest testing fatigue, Goodrich, does not teach or suggest fatigue values of at least about 100,000 cycles at 2000 microstrains. In fact, Goodrich does not suggest a fatigue value of more than 20,000 when only at 1000 microstrains.

The combination of Helf, Walter, and Goodrich does not disclose or suggest determining the shear modulus, strain tolerance and bending creep stiffness of at least one polymer-modified binder and then selecting a binder for making an asphalt mixture after performing and based on these 3 measurements, as claimed in claim 42. The combination of Helf, Walter and Goodrich also does not disclose or suggest determining the rotational viscosity of at least one polymer-modified binder and then selecting a binder for making an asphalt mixture after performing and based on the rotational viscosity measurement, as claimed in claim 43.

Claims 46-54 depend from claim 45 and are novel and non-obvious in view of the cited references for the same reasons that claim 45 is novel and non-obvious. In addition, the cited combination of references does not disclose or suggest the temperature at which an interlayer and an overlay should be applied, as claimed in claim 46. Helf, Walter and Goodrich also do not disclose or suggest the temperature at which an interlayer can be exposed to temporary traffic, as claimed in claim 54.

In addition to depending from independent claims that are novel and non-obvious in view of the cited references, claims 44 and 53 are patentable for an additional reason. The combination of Helf, Walter and Goodrich does not disclose or suggest performing volumetric

testing on a proposed asphalt mixture and then selecting the asphalt mixture for the interlayer after performing and based on volumetric performance of the proposed asphalt mixture, as claimed in claims 44 and 53.

Claim 48 also is novel and non-obvious for an additional reason. Neither McDonald alone nor in combination with the other cited references discloses or suggests sealing cracks in a roadway before applying an interlayer, as claimed in claim 48. In fact, McDonald does not even suggest making an interlayer and does not suggest sealing cracks before applying his elastomeric pavement repair composition. To the contrary, at column 9, lines 18-41, McDonald teaches applying a hot elastomeric material as a continuous layer to the area to be repaired followed by placing aggregate on the material.

Besides the reasons outlined above, independent claim 57 is patentable for an additional reason. Helf in view of Walter and Goodrich does not disclose or suggest performing a ductility test on at least one polymer-modified binder and selecting a binder for making an asphalt mixture after performing said ductility test and based on said ductility test, as claimed in independent claim 57.

Claims 58-59 depend from claim 57 and are novel and non-obvious in view of the cited references for the same reasons that claim 57 is novel and non-obvious. In addition, the combination of cited references does not disclose or suggest that the selected polymer-modified binder has a ductility of at least about 10 cm, at 4°C on RTFO residue at 5 cm/min strain rate, when using straight-sided molds, as claimed in claim 58. Furthermore, the combination of the cited references does not disclose or suggest selecting an asphalt mixture for making an

interlayer that has a Hveem Stability at 60°C and 50 gyrations of at least about 18 **and** a Flexural Beam Fatigue of at least about 100,000 cycles at 2000 microstrains, 10 Hz, about 2-4% air voids, and at a temperature of about 0 to 30°C, as claimed in claim 59.

Another aspect of the present invention is forming an interlayer from an asphalt mixture having particular performance characteristics. The combination of Helf, Walter and Goodrich does not disclose or suggest an asphalt mixture with a particular minimum stability and a particular minimum fatigue life, as claimed in claim 55. More specifically, the combination of Helf, Walter and Goodrich does not disclose or suggest forming an asphalt mixture having a Hveem stability at 60°C and 50 gyrations of at least about 18 **and** a Flexural Beam Fatigue of at least about 100,000 cycles at 2000 microstrains, 10 Hz, about 2-4% air voids and at a temperature of about 0 to 30°C, as claimed in claim 55. The specific minimum stability and fatigue values that are claimed in claim 55 are not even mentioned by any of the cited references. Further, this combination of references does not disclose or suggest forming an interlayer for a roadway from the asphalt mixture described above, as also claimed in claim 55.

Claim 56 is novel and non-obvious in view of the cited references for the same reasons that claim 55 is novel and non-obvious. In addition, the combination of Helf, Walter and Goodrich does not disclose or suggest that the asphalt mixture used to form the interlayer is made from a polymer-modified asphalt binder having a ductility of at least about 10 cm, at 4°C on RTFO residue at 5 cm/min strain rate, when using straight-sided molds, as claimed in claim 56.

**No Motivation for Modifying Helf**

The obviousness rejection is premised upon the combination of Helf with Walter and Goodrich, namely that it would have been obvious to a person of ordinary skill in the art to apply the tests taught by Walter and Goodrich to the pavement of Helf. In the previous section we have demonstrated that the obviousness rejection is flawed because applying the teachings of Walter and Goodrich to Helf would not arrive at Applicant's claimed invention. Specifically, there is no teaching or suggestion of (1) choosing specifically, a stability test and a fatigue test, (2) using a combination of performance tests to select an asphalt mixture and (3) selecting an asphalt mixture based on the stability and fatigue performance obtained by such tests. However, this obviousness rejection also is fundamentally flawed for another reason: The cited references are not properly combinable.

The Helf invention is concerned with a very unique kind of paving material. The paving material of Helf requires a "flexible aggregate", a term defined by Helf. This term and its definition are discussed in more detail at page 17 of this response. Walter, on the other hand, is concerned with an asphalt pavement material containing incinerator residue that exhibits sufficient stability. Walter does not even contemplate using "flexible aggregate" in his paving composition and instead suggests the use of mineral aggregates, such as sand, stone, and/or lime. One reviewing Walter would be motivated to look to other references that teach achieving the same goals, such as improving stability or incorporating incinerator waste. As Helf provides no teaching of testing stability or adding incinerator waste, one looking to improve Walter would have no motivation to look to Helf.

In addition, Goodrich is not concerned with using “flexible aggregate” and in fact does not even mention its use. Instead Goodrich is concerned with making a polymer-modified asphalt that exhibits better performance properties, including a better flexural fatigue life. One trying to improve upon Goodrich would be motivated to look to other references that teach achieving a better flexural fatigue life. As Helf provides no teaching of ways to improve flexural fatigue life, one looking to improve Goodrich would have no motivation to look to Helf.

In addition to the foregoing reasons, neither Walter nor Goodrich would look to Helf to improve its asphalt composition, as both of these references are focused on asphalt compositions and not aggregate composition. Still further, Helf would not look to Walter or Goodrich to improve his “flexible aggregate” invention, as Walter and Goodrich do not even suggest the possibility of using “flexible aggregate” in their paving compositions. Accordingly, there is no motivation from the cited references to modify Helf to suggest Applicant's claimed invention.

In addition, there is no suggestion by Helf or Walter that Walter's base course could be useful in forming Helf's interlayer or surface course, and there is no suggestion by Helf or Goodrich that Goodrich's new asphalt formulation could be useful in forming an interlayer. In fact, Goodrich merely suggests performing a fatigue test to verify the properties of his new chemical formulation and not to design any road layer. Accordingly, there is no motivation to combine Helf, Walter and Goodrich.

Still further, there is no motivation to modify Helf so as to suggest a minimum Hveem stability of 18, as claimed in claims 38 and 55, when none of the cited references suggests such a minimum stability. Similarly, there is no motivation to modify Helf so as to suggest a minimum

Flexural Beam Fatigue of at least 100,000 cycles at 2000 microstrains, as claimed in claims 39 and 55. This is because none of the cited references even suggests a Flexural Beam Fatigue of 100,000 cycles at 2000 microstrains. For the foregoing reasons, there is no motivation from the cited references to modify Helf using Walter and Goodrich to suggest Applicant's claimed invention.

**No Expectation of Success**

One of ordinary skill in the art would not have a reasonable expectation of success in achieving Applicant's claimed invention from the teachings of the cited references. More specifically, one of ordinary skill in the art would not have a reasonable expectation of success in developing Applicant's claimed method of selecting an asphalt mixture for making interlayer using the teachings of the cited references.

Helf teaches away from the present invention by teaching the use of flexible material, such as vulcanized rubber from recycled tire material, in place of traditional aggregate, which can be sand, rocks or other minerals. In doing this, Helf redefines the term "aggregate" in his patent so that this term is not used with its conventional meaning to one of ordinary skill in the art. Helf has been his own lexicographer and has developed the term "flexible aggregate" to mean rubber pieces put in an asphalt mixture. Traditionally, one of ordinary skill in the art would consider the term "flexible aggregate" an oxymoron because aggregate is **not** flexible.

By teaching that an interlayer be made with "flexible aggregate", Helf teaches away from making an interlayer, such as Applicant's interlayer, from merely aggregate in the word's ordinary meaning, namely, rocks, sand or other minerals. This difference is significant. When using substantial amounts of rubber pieces in place of aggregate, an asphalt slurry is created

rather than creating a paving layer with good load bearing capacity. One concerned with the stability of the interlayer being created would not look to a reference, such as Helf, that teaches making a slurry.

In addition, Helf teaches away from the present invention by teaching that the same design procedure can be used to make an interlayer or a surface course. By teaching that the designs of an interlayer and a surface course are interchangeable, Helf suggests that there are not specific performance characteristics, such as stability and fatigue, that one might want to use to develop an interlayer but not a surface course. In fact, none of the cited references teaches designing an asphalt mixture specifically for an interlayer, as done by Applicant. By formulating an asphalt mixture that is specifically for an interlayer, a better design that meets the needs of an interlayer can be made.

The claimed invention is specific to selecting an asphalt mixture for creating an **interlayer** and is not for making other layers of a paved road. One of ordinary skill in the art would have no expectation of making a successful interlayer based on performance tests when no cited reference teaches characteristics that are specific to only an interlayer. The way the asphalt mixture for the interlayer is selected is a key part of Applicant's invention. By using stability and fatigue performance to select an asphalt mixture for making an interlayer, a better interlayer can be created. For the foregoing reasons, one of ordinary skill in the art would not have a reasonable expectation of successfully achieving Applicant's claimed invention from the teachings and suggestions in the cited references.


**Conclusions**

In view of the foregoing amendments and remarks, it is respectfully submitted that the claims now presented are patentable over the prior art of record and therefore in condition for allowance and eventual issuance. Such action is respectfully requested. Should the Examiner have any further questions or comments which need be addressed in order to obtain allowance, please contact the undersigned attorney at the number listed below.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 19-4409.

Acknowledgement of receipt is respectfully requested.

Respectfully submitted,

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